ANCHOR QEA

Lower Willamette River
Revised Fate and Transport Modeling Study

Sediment Aroclor-Homolog Relationships

March 11, 2010

Introduction

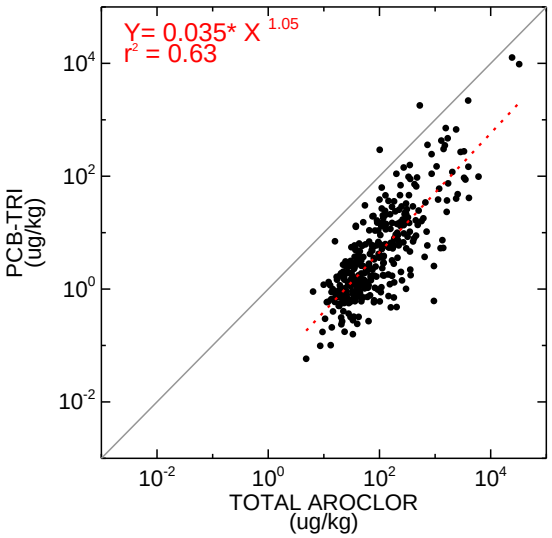
- Approach for Modeling Total PCBs
  - Simulate subset of PCB homologs (Tri, Tetra, Penta, Hexa, Hepta)
    - These account for ~90% of the sediment tPCB mass
  - Model each homolog separately, sum, and scale-up to calculate tPCB
- Homolog data set in sediments is limited
  - Supplement with Aroclor-based data
  - Requires development of relationships between homologs and Aroclors

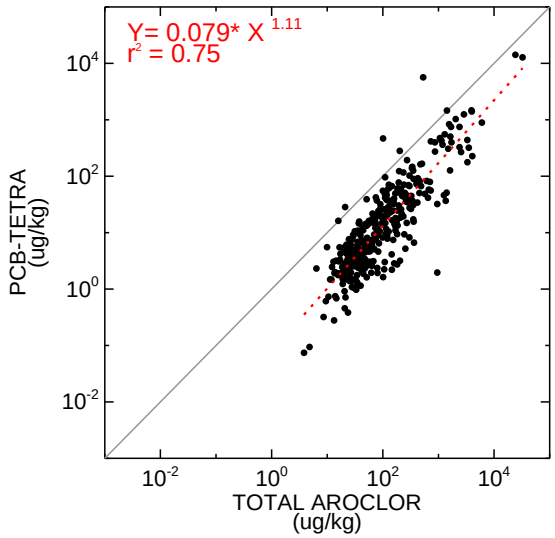
Aroclor-Homolog Relationships

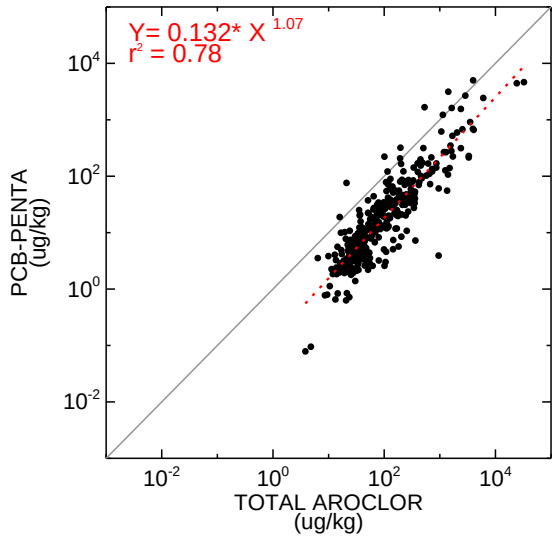
- Developed Regressions to Relate Homolog and Aroclor Concentrations
  - Developed regressions for all data
  - Also examined subsets of the data:
    - Separate by depth (i.e., surface and subsurface)
    - Separate data laterally (i.e., east, nav. channel, west)
    - Separate data longitudinally based on observed large-scale differences in composition
  - Evaluated different regression models
    - Homologs versus Total Aroclors
    - Multiple regression of homologs versus most commonly detected Aroclors (1242, 1248, 1254, and 1260)

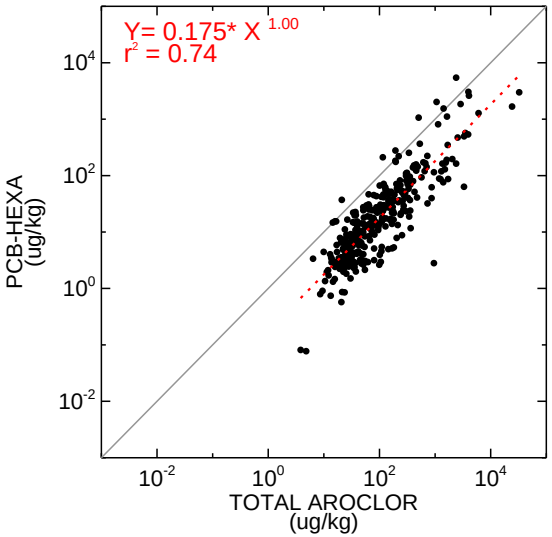
Aroclor-Homolog Relationships

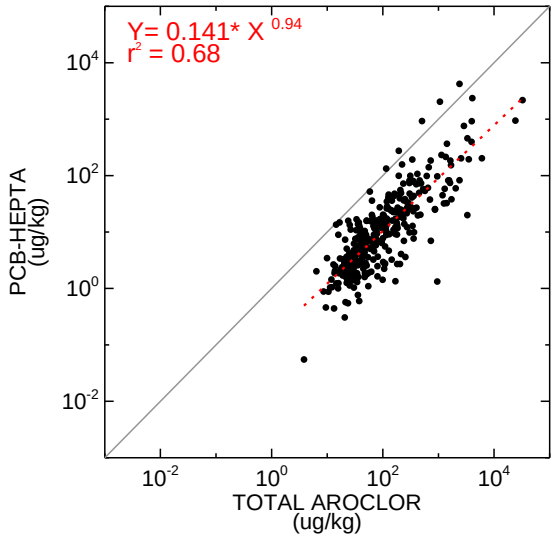
- Overall Objective
  - Find a relationship (or combination of relationships) that minimizes variability
- Conclusions
  - The relationship was robust using all data
  - Separation of data spatially or with depth offered no significant reduction in variability
  - Multiple regression model resulted in no significant improvement over simpler relationship of homologs to Total Aroclors
- Recommend Using Simplest Relationship of Homologs to Total Aroclors (R^2 generally 0.7-0.8)











Regression Analysis of Paired Total Aroclor and Homolog Sediment Data

Note: Total Aroclor is a sum of all available Aroclors, summed according to RA summing rules (ND=1/2 MDL).
Regressions done on detect data only.

Outliers LW2-C025-C1 and LW2-C266-C eliminated from regressions.

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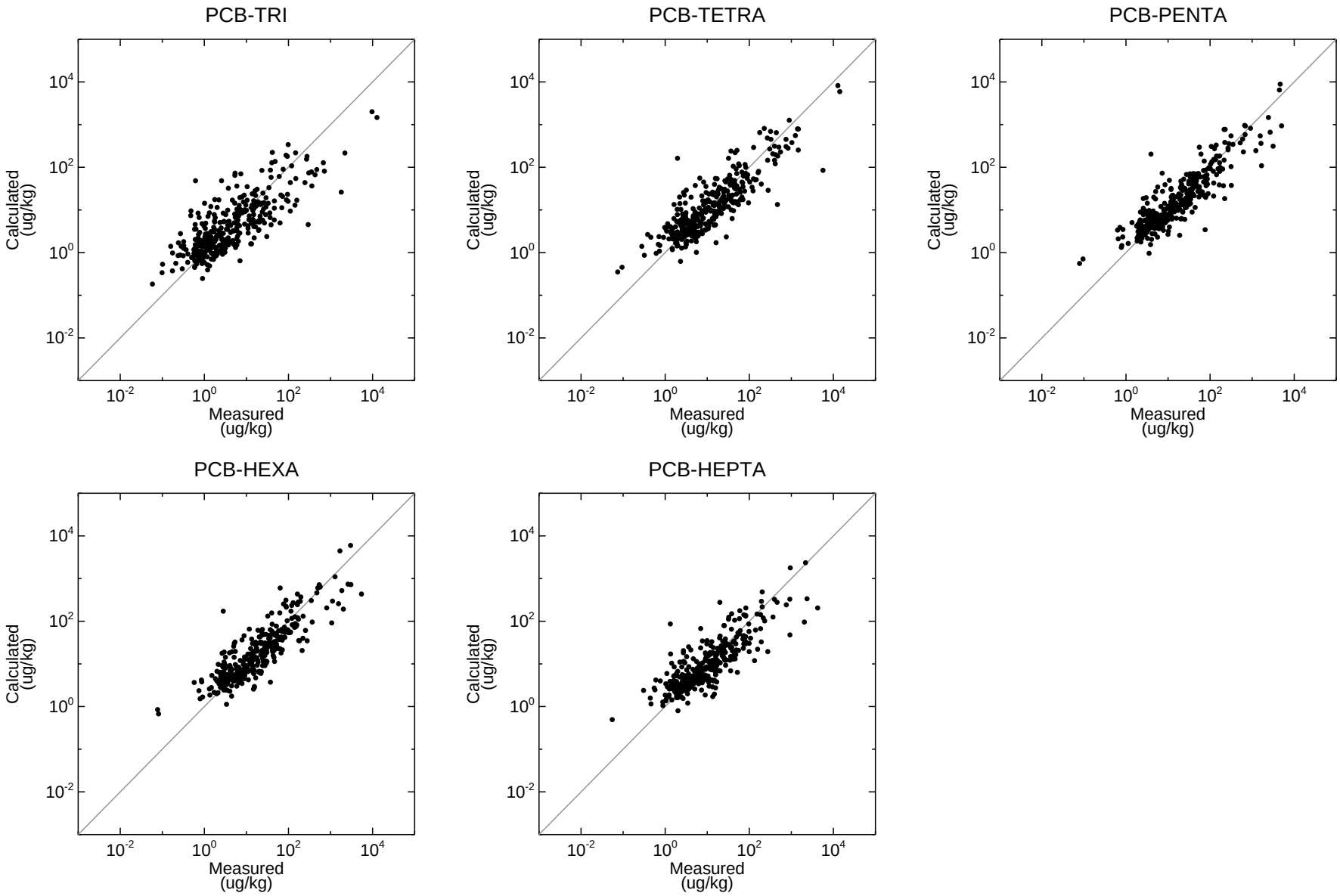

Comparison of Measured and Calculated Homolog Data Based on Regression of Homologs and Total Aroclors

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